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Story by Barbara Honegger, Senior Military Affairs Journalist

Assistant Professor of Mechanical and Astronautical Engineering Marcello Romano, a pioneer in spacecraft robotics, has won the 2006 Carl E. and Jesse Menneken Faculty Research Award for Excellence in Scientific Research. The founder of the NPS Spacecraft Robotics Laboratory and a member of the school's Space Systems Academic Group (SSAG) received the honor at the Fall 2006 awards ceremony.

The research for which Romano was recognized, "Experimental Verification of Navigation and Control Algorithms for Autonomous Proximity Maneuvers and Docking among Spacecraft," was sponsored by the Air Force Research Laboratory, Space Vehicle Director, in 2005 and 2006.

"Laboratory simulation of the autonomous approach and docking of chaser satellites with friendly spacecraft is a perfect match between my background and one of the major areas of future importance to the Department of Defense," said Romano in an interview following the ceremony. "It offers a low-risk and relatively low-cost intermediate validation step between analytical-numerical simulations and expensive in-flight missions, and will make it possible to service spacecraft already in orbit and thus extend their life, greatly reducing costs. And by connecting smaller satellites, it may be possible to build larger in-space systems to achieve a wide variety of missions."

"Professor Romano's unique test-bed research gives NPS officer students a once-in-a-lifetime opportunity to work hands on with an enabling technology for many critical DoD missions," said Prof. Anthony Healey, chairman of the Department of Mechanical and Astronautical Engineering. "It has allowed the advance testing of the prototype docking interface mechanism that will be used by the Defense Advanced Research Projects Agency's (DARPA) in its Orbital Express mission to be launched in January 2007. This mission will test autonomous docking and on-orbit servicing for the first time."

"Professor Romano is very deserving of this prestigious honor," said Prof. Rudy Panholzer, chair of the SSAG. "His research is critical for the Department of Defense and the education of military officers at NPS. He is an active and enthusiastic member of the Space Systems Academic Group, a dedicated researcher and a fine teacher who has the best interests of his students in mind."

In an interview following the award's announcement, Romano insisted on sharing the credit with his students.

"The research accomplishments that brought me to deserve this award would not have been possible without the dedicated participation of my students, especially Air Force Capt. David Friedman and Lt.

Cmdr. Tracy Shay who are co-authors with me on an important paper that's been accepted for publication," Romano stressed. "They helped a lot in the research that is the basis for this award."

Friedman, who now manages aerospace industry programs at Buckley Air Force Base in Colorado, praised Romano's mentoring style.

"This award couldn't have happened to a better advisor and instructor," Friedman said. "Professor Romano was really good at letting students run the research in the laboratory on a day-to-day basis, so you'd learn as much as possible, but was hands on in helping you to solve problems when you needed it.

"Because my thesis research heavily involved current technology, including prototypes of current satellite pieces," Friedman added, "I often find myself looking back to what I learned at NPS when confronted with problems in the aerospace industry."

Capt. Alan Scott, NPS program officer for space systems engineering and operations, also emphasized the importance of Romano's work on spacecraft robotics for the aerospace industry.

"Professor Romano's research is important not just for the Department of Defense, but for the space business as a whole," Scott said. "He has done some really great work that dovetails with our NPS space systems curricula, because of the huge focus today on just this area of research using small chaser satellites to rendezvous and group with other spacecraft to perform modularized missions. Using smaller satellites keeps costs down, and they're much easier to manage."

The third co-author with Romano and Friedman, Lt. Cmdr. Tracy Shay, received his master's degree in astronautical engineering in December 2005 and is currently communications officer for the Abraham Lincoln Strike Group.

"Working with Professor Romano was great," Shay recalled. "While Dave (Friedman) worked the software and I designed the vehicle, he showed great confidence in us and gave us a lot of latitude to make almost all the design decisions, while also maintaining oversight."

Lt. Cmdr. Blake Eikenberry, another recent student of Romano's, added a third autonomous spacecraft simulator to the original two for his thesis research.

"Working with Professor Romano is the best combination," said Eikenberry, now communications officer for Destroyer Squadron Two in Norfolk, Va. "He gives you a lot of freedom in the lab, but is there to support and guide you when you need it. With a difficult problem like the one I addressed, you definitely do need it. The moment you go from two to three autonomous vehicles, the complexity of the problem increases exponentially."

A current doctoral student of Romano's, Air Force Maj. Shawn McCamish, is doing his research on the electrical engineering of multiple spacecraft control.

"I've been impressed with Professor Romano's knowledge and enthusiasm as an instructor," McCamish said. "As my primary Ph.D. research advisor, he has become my most accessible and supportive faculty member. He mentors and motivates students by being responsive to their questions and interests, and his dedication to guiding NPS students in their research is critical to enabling important research contributions for the Department of Defense."

In addition to Friedman and Shay, Lt. Cmdr. Jason Hall also earned a master's degree in astronautical engineering based on thesis research related to the project. Five NPS students, including two doctoral students, are currently working with Romano on follow on developments of the research for which he received the Menneken Award.

The chairman of the award selection committee was NPS Professor of Electrical and Computer Engineering Douglas Fouts. Other members were Associate Professor of Electrical and Computer Engineering John McEachen, Associate Professor of Information Science Mark Nissen, and retired Rear Adm. Merrill Ruck, executive director of the NPS Foundation.

Romano received his Ph.D. in astronautical engineering in 2001 and a master's degree in aerospace engineering in 1997, both from Politecnico di Milano in Milan, Italy. He has been an associate fellow of the U.S. National Research Council and a visiting researcher with the European Centre for Particle Physics and the European Space Agency. Romano was a National Research Council postdoctoral fellow at NPS before returning to join the faculty in October 2004.

For more information about Naval Postgraduate School spacecraft robotics research, contact Romano at (831) 656-2885, mromano@nps.edu. For more information about the NPS Space Systems Academic Group, contact Panholzer at (831) 656-2154, rpanholzer@nps.edu. For in depth information on all NPS programs, go to www.nps.edu.